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Forest Insect and Disease Management

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BIOLOGICAL
EVALUATION R2-77-6

MOUNTAIN PINE BEETLE

Bighorn National Forest
and adjacent BLM, State
and Private Lands,
Wyoming

JULY 1977

Rocky Mountain Region

U.S. Department of Agriculture Forest Service

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INTRODUCTION

The mountain pine beetle, *Dendroctonus ponderosae* Hopkins, continues to cause ponderosa pine, *Pinus ponderosa* Laws, mortality along the Bighorn Front Range on National Forest, BLM, Wyoming State and private lands.

On June 28 and 29, 1977 Kent Eggleston and James Allen, Biological Technicians, conducted a brood sample survey of three areas infested with mountain pine beetle. Knight's (1960) sequential sampling plan 1/ was used to make population trend predictions for 1977. Samples showed that the population trend is static to increasing.

TECHNICAL INFORMATION

CAUSAL AGENT: *Dendroctonus ponderosae* Hopkins, mountain pine beetle

HOST: *Pinus ponderosa* Laws, ponderosa pine

LIFE HISTORY: The mountain pine beetle has one generation per year. Adults attack trees from mid-July through early September by boring through the bark to the cambium, then tunnel upward for 12 to 30 inches (these tunnels are called egg galleries). The females lay eggs in individual niches along each side of the gallery which is then packed with frass. After hatching, the larvae feed in individual channels (larval galleries) at right angles to the egg gallery, in the phloem. The insect overwinters in the larval stage. In the spring, when the larvae are fully developed they excavate an oval chamber (pupal chamber) at the end of the larval gallery and pupate. Finally mature adults emerge from these pupal chambers by boring through the outer bark surface and fly to attack new trees, completing the generation.

1/ KNIGHT, F. B. 1960. Sequential sampling of Black Hills beetle populations. USDA, For. Serv., Rocky Mtn. For. and Range Exp. Sta. Res. Note #48. 8 p.

METHODS

Utilizing Knight's (1960) sequential sampling plan, two 6-by-6-inch bark samples were taken at dbh on opposite sides of currently infested ponderosa pine trees. Samples were taken at 3 sites; Mosier Gulch, Piney Creek and Crystal Spring Draw. The Mosier Gulch sample was taken on BLM land, the other samples were taken on National Forest lands.

RESULTS AND DISCUSSION

Two of the samples, Piney Creek and Crystal Spring Draw #2, showed a slightly increasing trend, Mosier Gulch showed a static trend and Crystal Spring Draw #1 showed a decreasing population trend (Table 1). The total brood samples indicates a static to increasing population (748 immature beetles from 94 samples). The average brood (7.96 immatures per sample) indicates a 1 : 1 or less build-up ratio, McCambridge, W.F. 2/

Brood samples were highly variable. Some of the variability appeared to be due to interspecific competition with flatheaded wood borers, *Buprestidae*. Where buprestids were found in the brood sample, brood was consistently low. Higher brood numbers were noted toward the base of trees where the trees had not dried out as much as they had at dbh or higher.

While 1977 ponderosa pine losses to the mountain pine beetle will still be high, they are not expected to be significantly greater than losses in 1976.

RECOMMENDATIONS

Direct control is not recommended for general use. Direct control may be used in cases when high value trees are threatened, such as trees around campgrounds or near private homes or businesses.

2/ Personal communication.

Properly applied silvicultural practices will give the land manager effective long-term protection against recurring mountain pine beetle outbreaks. [3] & [4] Salvage logging of currently infested stands will give temporary relief for the infested stands, as well as utilize dead and dying trees. Salvage logging should be followed by proper silvicultural treatment within 3 to 5 years or the stand may become reinfested. Stands should be thinned to a growing stock level of 80 [5] through timber sales or other thinning practices.

3/ SARTWELL, C. and R. E. DOLPH. 1976. Silvicultural and direct control of mountain pine beetle in second growth ponderosa pine. USDA, For. Serv. PNW For. and Range Exp. Sta. Res. Note PNW-268. 8 p.

4/ SARTWELL, C. and R. E. STEVENS. 1975. Mountain pine beetle in ponderosa pine; prospects for silvicultural control in second-growth stands. Journal of Forestry, Vol. 73 No. 3. 5 pp.

5/ MYERS, C. A. 1974. Multipurpose silviculture in ponderosa pine of the Montane Zone of Central Colorado. USDA, For. Serv., Rocky Mtn. For. and Range Exp. Sta. Res. Pap. RM-132. 15 pp.

TABLE 1

1977 BIGHORN NATIONAL FOREST MPB BROOD SURVEY SUMMARY SHEET

AREA	NUMBER TREES	AVERAGE DBH ± S. E.	NUMBER SAMPLES	TOTAL BROOD	AVERAGE BROOD ± S.E.	TOTAL STARTS	AVERAGE STARTS ± S.E.	TOTAL INCHES OF GALLERY	AVERAGE INCHES OF GALLERY ± S.E.	TOTAL CLERIDS	TOTAL MEDETERA	BASAL AREA	WOOD-PECKERING	PREDICTED TREND	PREDICTED BUILD-UP RATIO
BIGHORN NATIONAL FOREST															
Mosier Gulch	14	12.17 ± .87	28	177	6.32 ± 1.19	82	2.93 ± .20	967	34.54 ± 1.79	10	11	130	Light	Static	1 : 0.6
Piney Creek	10	11.20 ± .57	20	253	12.65 ± 2.38	35	1.75 ± .16	491	24.55 ± 2.10	11	2	145	Light	Increasing	1 : 1.2
Crystal Spring Draw #1	12	10.08 ± .80	24	79	3.29 ± .85	59	2.45 ± .12	778	32.42 ± 1.47	7	11	170	Light	Decreasing	1 : 0.3
Crystal Spring Draw #2	11	12.95 ± .86	22	239	10.86 ± 2.72	47	2.14 ± .18	659	29.95 ± 1.62	18	0	160	Light	Increasing	1 : 1.1
TOTAL OR AVERAGE	47	11.61 ± .42	94	748	7.96 ± 1.37	223	2.37 ± .10	2,895	30.80 ± .94	46	24	149	Light	Static to Increasing	1 : 0.8

TABLE 2

BIGHORN NATIONAL FOREST

AREA	DBH		BROOD		STARTS		GALLERY	
	Σx	Σx^2	Σx	Σx^2	Σx	Σx^2	Σx	Σx^2
Mosier Gulch	170.4	2,212.22	177	2,183	82	270	967	35,815
Piney Creek	112.0	1,283.88	253	5,359	35	71	491	13,723
Crystal Spring Draw #1	120.9	1,303.45	79	657	59	153	778	26,420
Crystal Spring Draw #2	142.5	1,928.01	239	6,025	47	115	659	20,947
	545.8	6,727.56	748	14,224	223	609	2,895	96,905

FIGURE 1
MOUNTAIN PINE BEETLE BROOD SURVEY AREAS 1977